

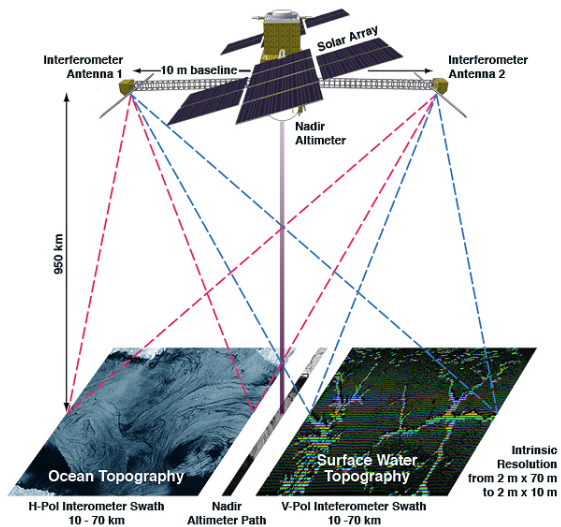




SWOT, Science Team meeting, Pasadena, June 13-16 2016

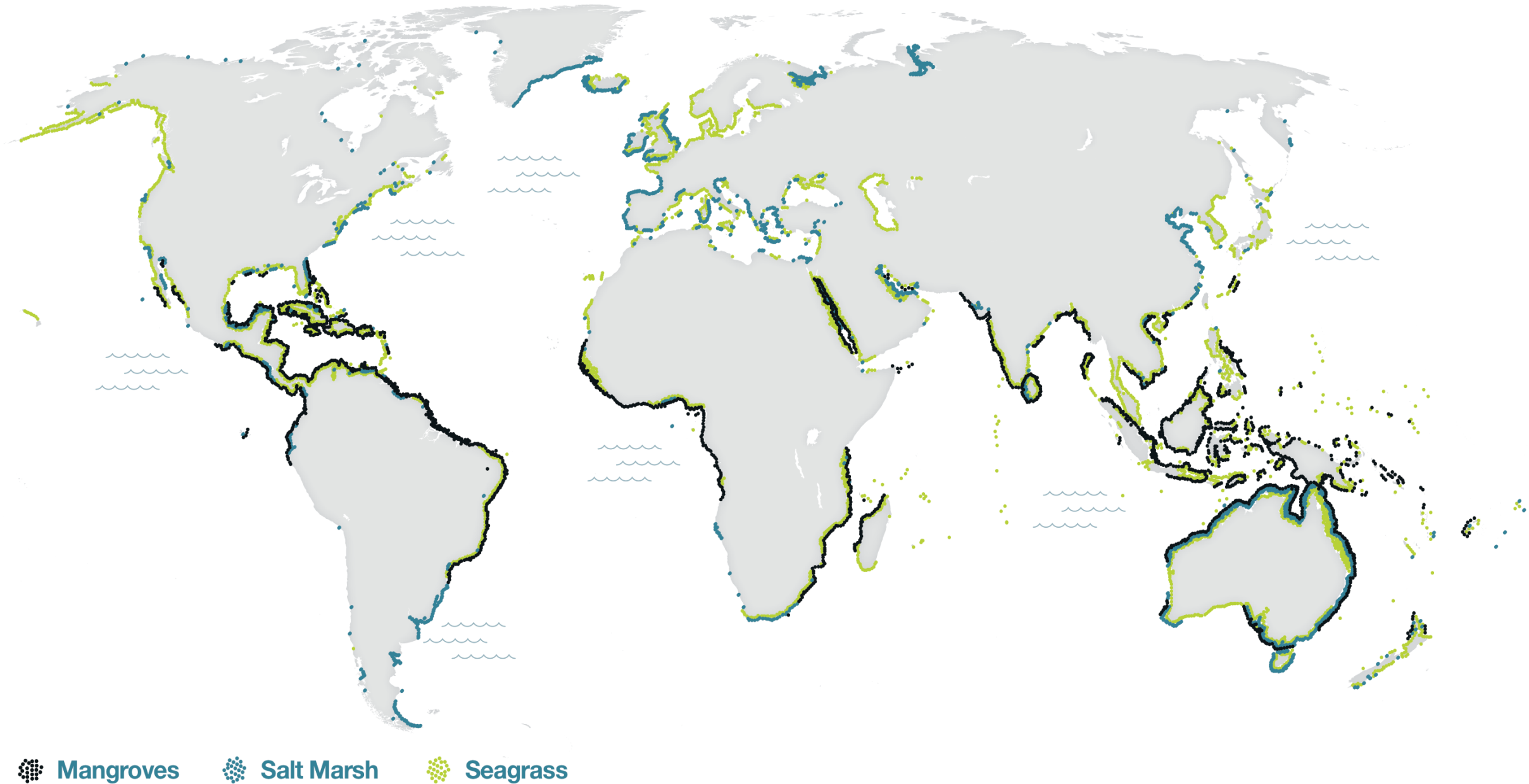
SWOT Wetlands Products: Presentation & Discussion

Marc Simard, Stéphane Calmant & Benoit Laignel

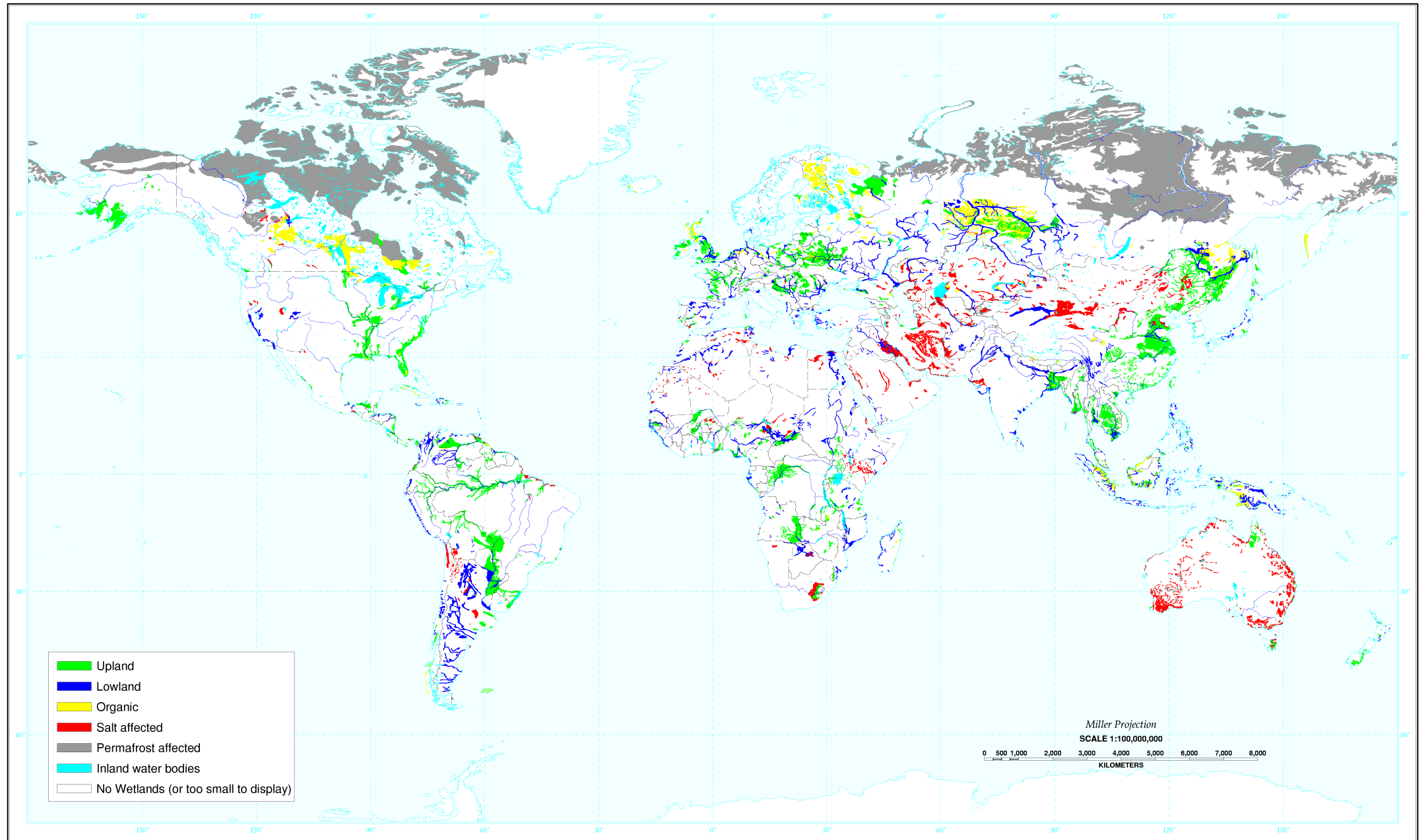


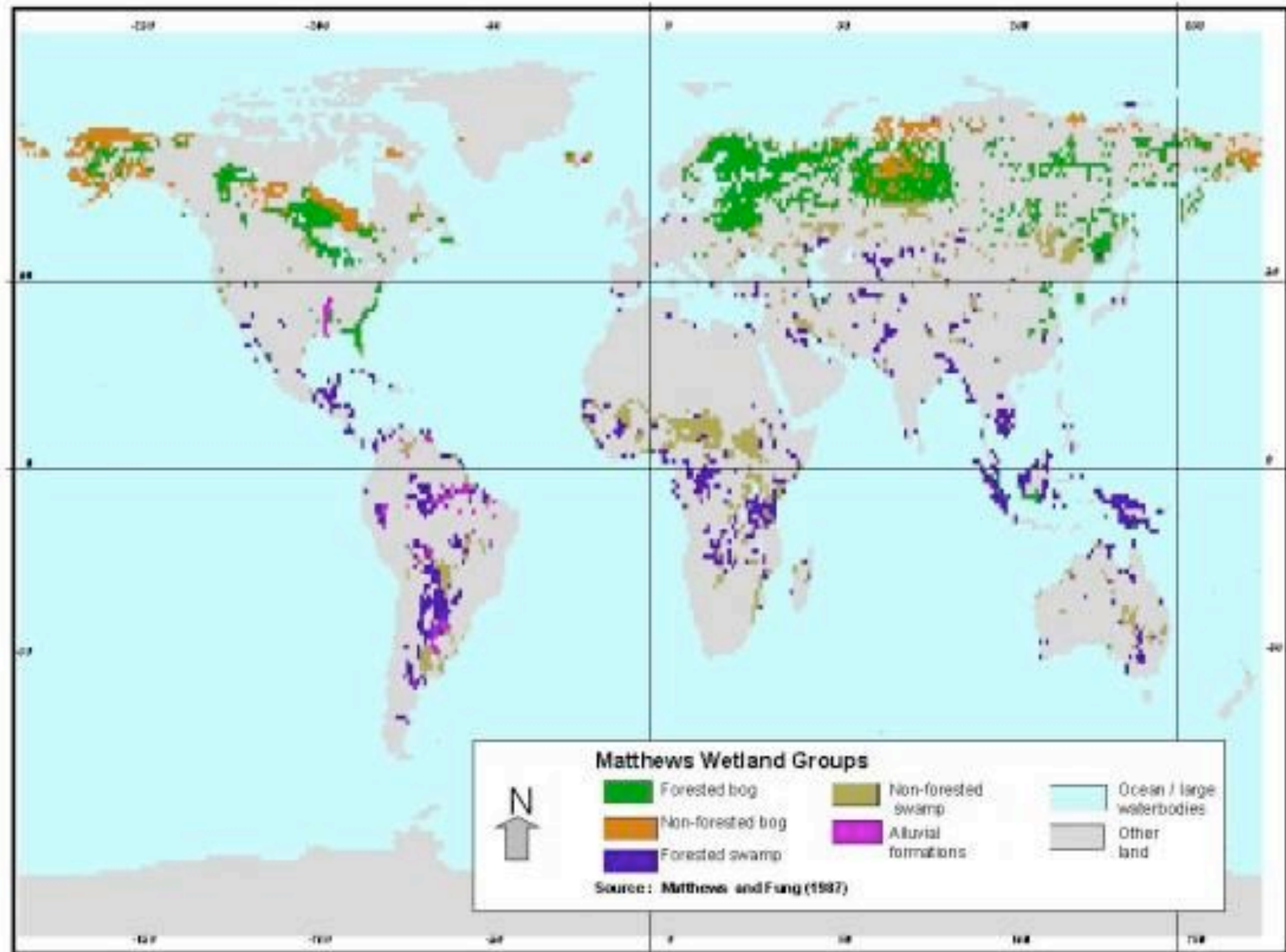


Global Distribution of **Blue Carbon Ecosystems**



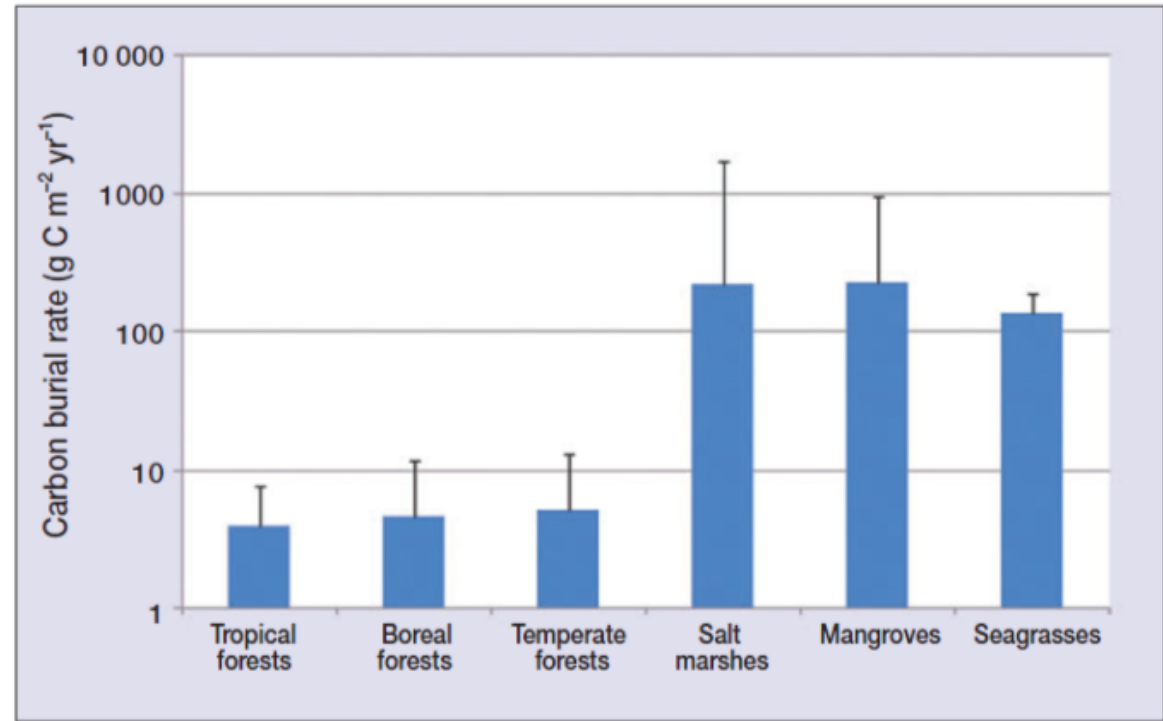
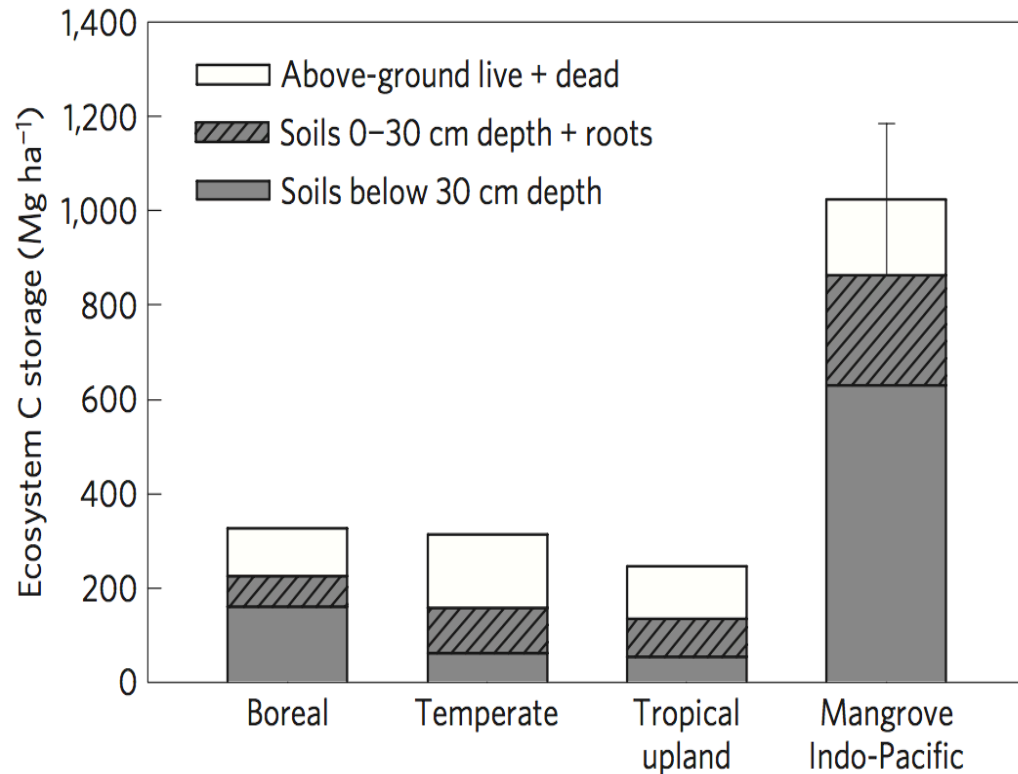
Distribution of Wetlands







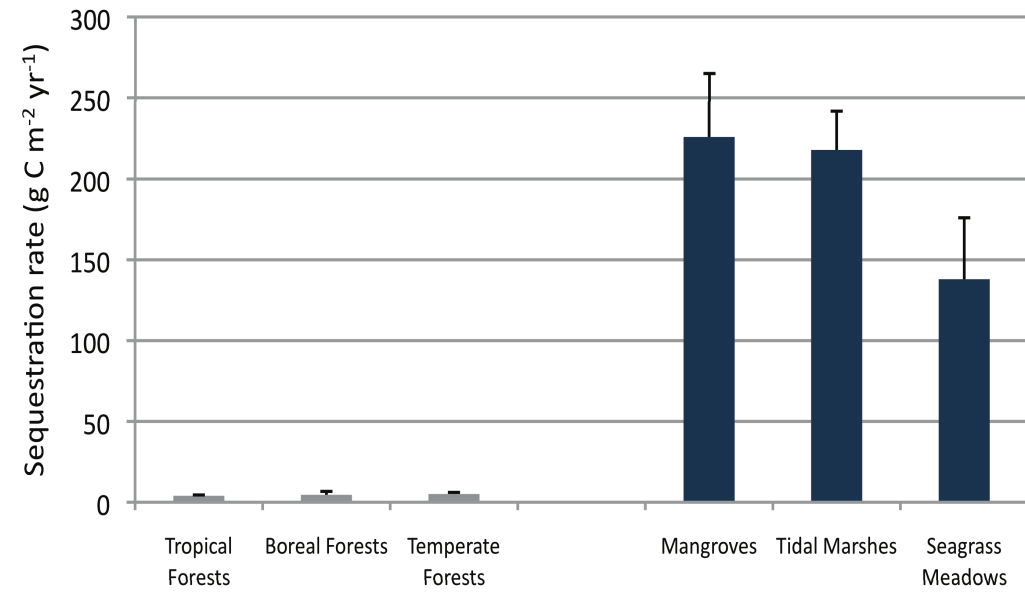
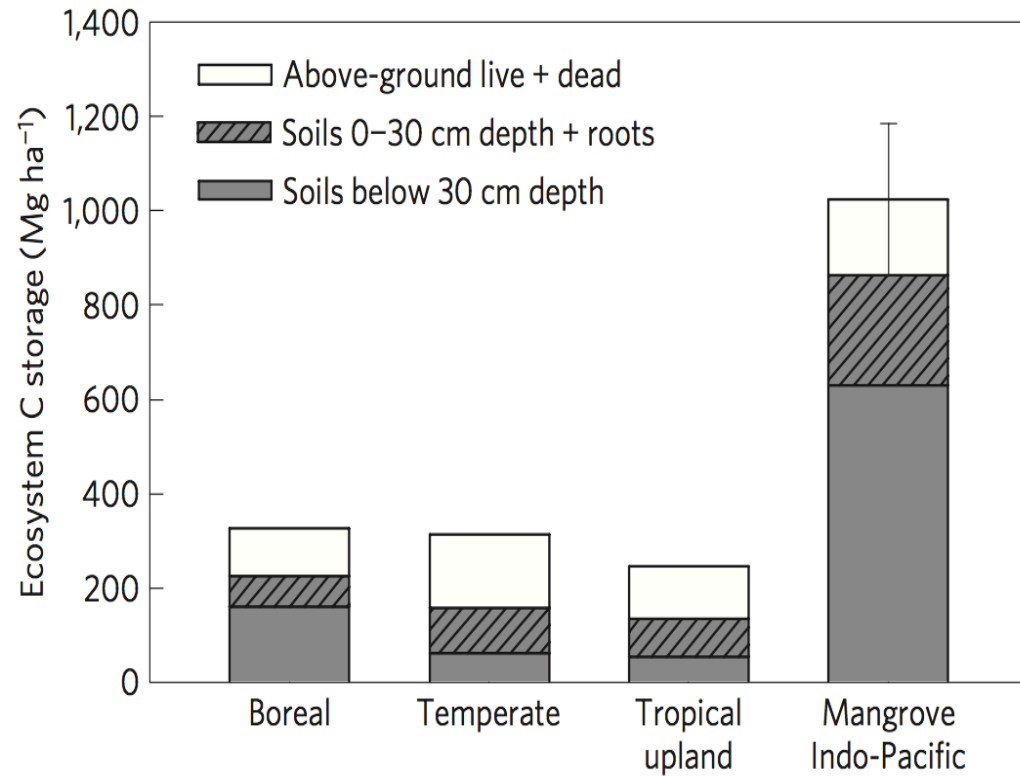
One of their ecosystem services: Carbon stocks



McLeod et al. 2011. *Frontiers in Ecology and Environment*



Carbon stocks

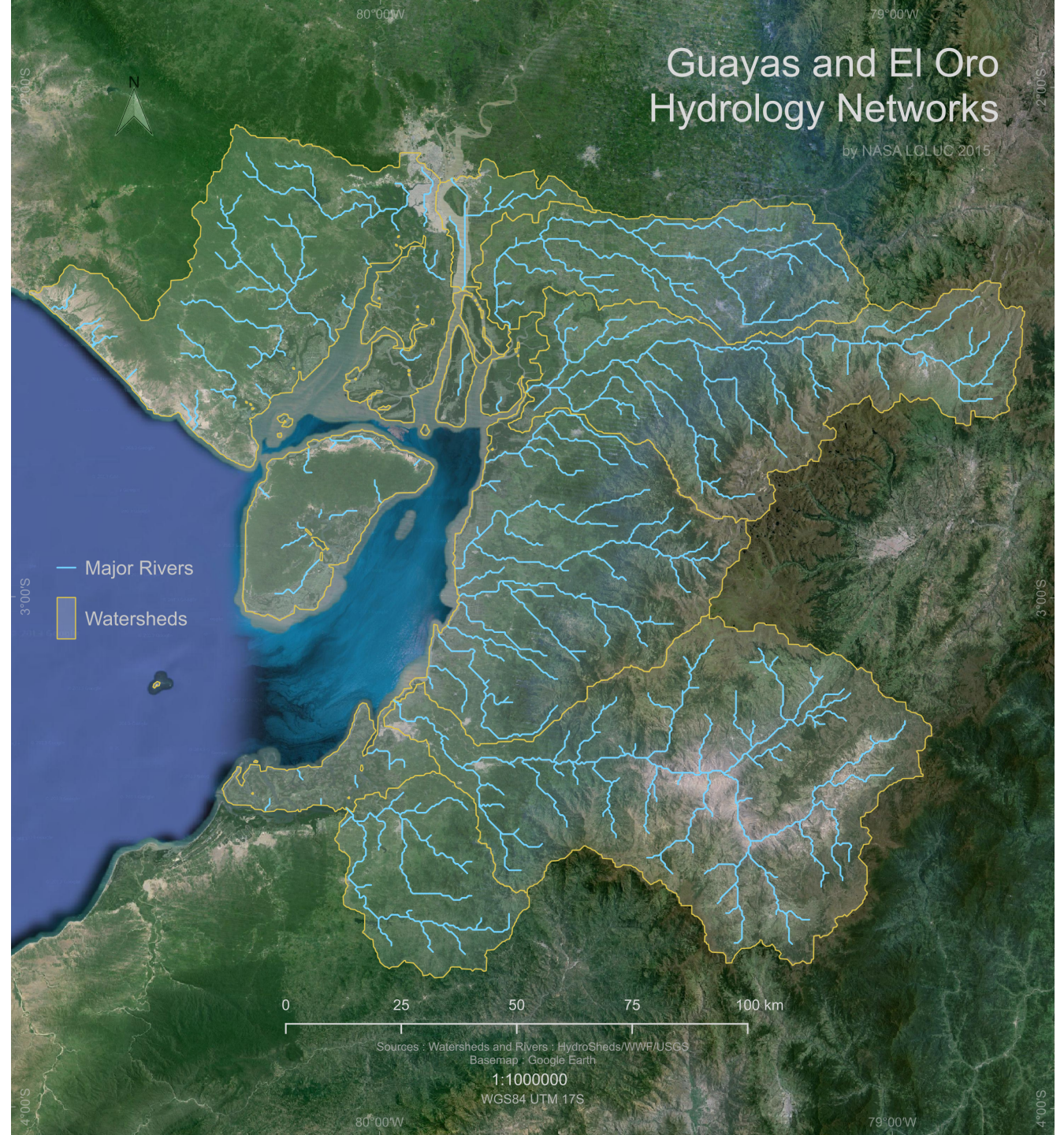


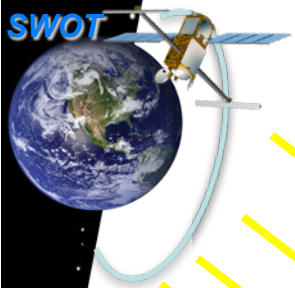


The wetland ecosystem processes are controlled by the underlying hydrology!

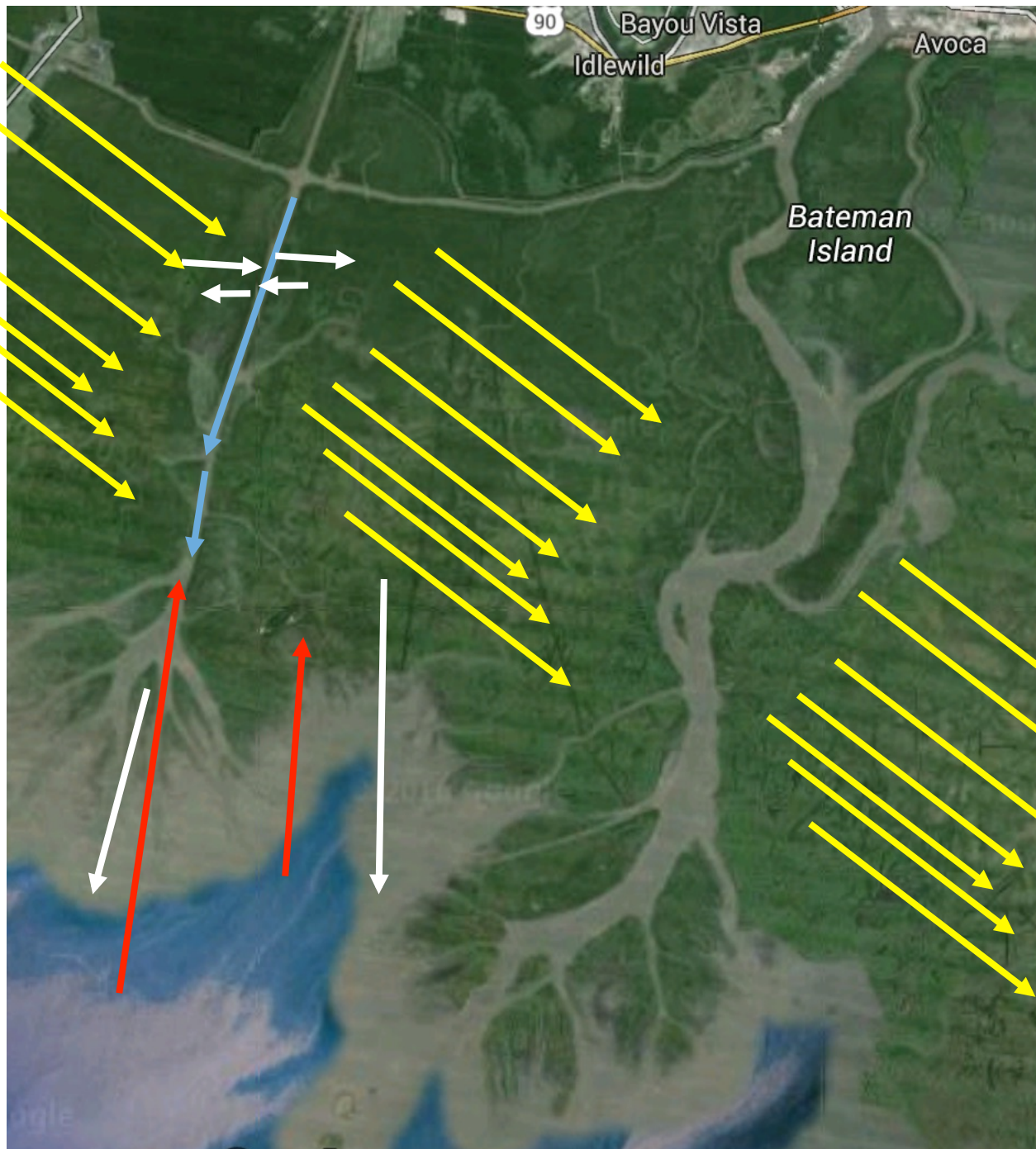


All processes happening
within the watershed
affect wetlands





Water Flows,
Not from here
to there...





Brain Storm of Coastal Ecosystem Products V0.1

1. Ecosystem vulnerability

1. Productivity

2. Soil accretion rates

2. Role in sediment, pollutants and carbon export to Oceans.

Hydrology is the underlying driver

- Customization: i.e. Highest resolution possible for custom averaging.
- Coastal ecosystem productivity depends on hydro-period, salinity, nutrient availability and light availability.
 - Tide Amplitude including Actual measurements of water surface elevation
 - Tidal Range
 - Tidal reach inland (flood extent)
 - Tidal reach within rivers
- Coastal ecosystem vulnerability depends on soil accretion rates, wave/storm action
 - River discharge through river slope measurements
 - Laminar flows through water level slope and change within wetland
- Seasonal/senescence sampling
 - From open water to submerged vegetation to emergent vegetation



Inland wetlands

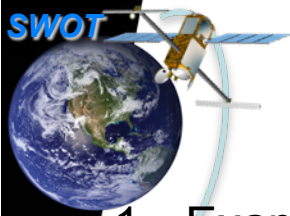
- May have open water, emergent grasses, emergent brushes and trees.
- Seasonal vegetation (in particular grasses)
 - Temperate senescence
 - Boreal freeze/thaw (e.g. tundra)
 - Tropical high/low flood (rain/dry seasons)
- Will require seasonal mask inputs to SWOT processor



Big Questions

- What are the Limitations of SWOT measurements in the presence of vegetation given canopy structure characteristics?
 - Canopy closure
 - Canopy biomass
 - Canopy type/structure
- Can SWOT be used to estimate emerging canopy height and/or biomass?
 - Ecosystem Productivity
 - Manning's n
- How will SWOT algorithms adapt to seasonal changes in landscape?
 - Dry/wet seasons
 - Freeze/thaw
 - High/low discharge from large basins (e.g. Mississippi delta)
- How can SWOT measurements of water surface elevation help understand the fate of water, sediments and carbon¹ in complex environments with competing currents
 - Tide vs river
 - River vs river
 - River vs sheet flows through wetlands.

¹ sediment and carbon is assumed to be from ancillary data (hyperspectral or in situ)

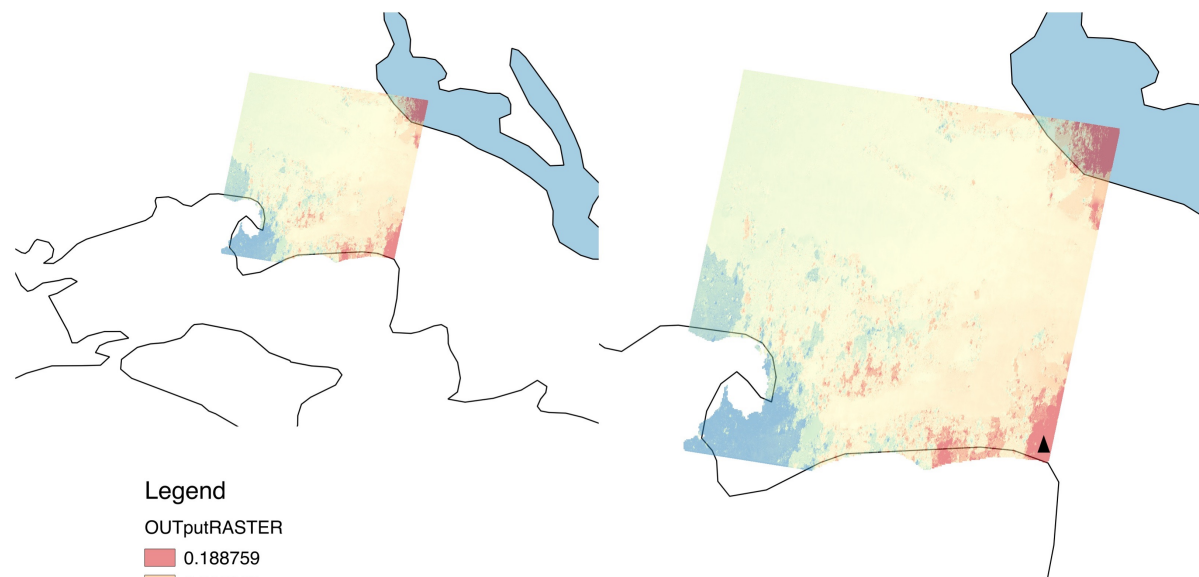


Some Items for Discussion

1. Examine utility of SWOT to observe storm surges in the coastal zones
2. Examine combined effect of the storm surges & river floods in the estuaries
3. Capabilities & limitations of SWOT to measure water level in tide-impacted wetlands located in estuaries & along coastlines as well as within inland wetlands given time varying condition
4. What are the limitations of SWOT measurements in the presence of vegetation & impact of the vegetation on layover
5. Improve knowledge of coastal & submesoscale processes & explore utility of SWOT in these coastal processes (at the coastal interface)
6. Define the SWOT science products specific to the coastal & estuary zones for the scientific community & users/stakeholders.
7. SWOT adaptivity to seasonality of inland and coastal wetlands types
 1. Time variability (seasonality)
 2. Landscape geophysical and functional characteristics



Water Level Change with Sentinel-1



Legend

OUTputRASTER

0.188759

0.216660

0.244561

0.272461

0.300362

ne_10m_rivers_north_america

ne_10m_lakes_north_america

ne_10m_admin_0_countries_lakes

ne_10m_admin_0_countries

CRMS Site: CRMS0543

Station: CRMS0543-H01

Mean water level difference between
01/28 and 02/09 (in meters):

-0.1779